

A Community-Based Asthma Management Program: Effects on Resource Utilization and Quality of Life

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Abstract

Objective: The Waianae Coast Comprehensive Health Center (WCCHC) developed an integrated community-based asthma management program in an effort to reduce inappropriate medical utilization and improve quality of life in their pediatric asthma population.

Methods: Over a period of three years, eighty-eight children with asthma participated in the community-based asthma management program. During this time, an automated asthma tracking system was developed, the WCCHC established a standard system of care based on the National Asthma Education and Prevention Program Expert Panel Report Guidelines for the Diagnosis and Management of Asthma (NAEPP Asthma Guidelines) adapted for cultural sensitivity, and a coordinated team care approach was implemented in the asthma management program.

Results: During the pilot study, forty children participated in the program. Among these forty individuals, there was a significant decrease in both per capita expenditures and asthma related visits after community health worker (CHW) intervention. Average per capita charges decreased from \$735 to \$181, Emergency Department (ED) visits decreased from 60 to 10, and

the overall asthma related visits decreased from 1.5 to 0.25 per person after the initial CHW encounter. These results were replicated during the 2000-2001 intervention period where average per capita charges decreased from \$310 to \$129 and ED encounters dropped from 32 to 10 after the first CHW encounter. In addition, the number of high utilizers- defined as those presenting to the ED two or more times for asthma-related diagnoses- sharply decreased from 176 in 1998 to only 16 in 2001. Quality of life improved, with 72% fewer nighttime and 96% fewer daytime symptoms reported after CHW intervention during the pilot study. During the year 2000, symptoms during exercise and asthma related doctor visits decreased 59% and 67% respectively after CHW intervention.

Conclusion: The community-based asthma management program demonstrated success in improving utilization patterns and reducing asthma-related expense among program participants. Improvement was also noted in quality of life as expressed through frequency and time of asthma symptoms. Other health care institutions may also be positively impacted by developing multidisciplinary team implemented, culturally-adapted, and scientifically-based disease management programs.

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Introduction

Asthma prevalence, morbidity, and severity rates in the pediatric population have been steadily rising. An increase of more than 40% over the past decade has elevated the asthma prevalence rate to greater than 5% of the United States' pediatric population.¹ This translates into an estimated 5 million children nationwide suffering from asthma, making it the most common chronic childhood disease.² In 2000, 5.8% of those 5 to 17 years old reported having an asthma episode in the past year.³

The State of Hawaii leads the nation in asthma prevalence, with 87.7 cases per 1000 persons as opposed to the national average of 55 cases per 1000 persons. The ethnic distribution shows Hawaiians as having the highest asthma prevalence in the State (Hawaiians/143.2 per 1000, Filipinos/75.7 per 1000, Chinese/72.6 per 1000, Others/82.7 per 1000, and Caucasians/71.8 per 1000).⁴ According to the 2001 Hawaii Health Survey, the age group with the highest asthma prevalence in Hawaii is birth to fourteen. In the same category, 15,245 of the 32,812 children are of Native Hawaiian ancestry.⁵ This data points to the Native Hawaiian childhood and youth population as having the highest asthma prevalence in the State of Hawaii.

Asthma care presents a substantial financial burden. The projected cost of asthma in the United States for the year 2000 was \$14.5 billion.⁶ Annual direct and indirect costs for asthma in Hawaii are estimated at 127 to 296 million dollars.⁷ Emergency Department (ED) visits and inpatient care are responsible for more than 40% of the total national medical costs for asthma.⁸ Between 1992 and 1999, ED visits increased 29% nationwide, with the pediatric population making up the majority of the visits. The rate of outpatient and ED visits continued to climb after 1995, while the hospitalization rate decreased.⁹ Children with asthma visited the ED 2.2 more times and paid 2.8 times more in total annual medical costs than those without asthma.¹⁰

With these factors in mind, the Waianae Coast Comprehensive Health Center developed an integrated community-based asthma management project to improve quality of life and decrease inappropriate medical utilization in their pediatric population. Located within a medically underserved area, the WCCHC services the most Native Hawaiians in the State of Hawaii. Waianae has the youngest population as well as the highest percentage of Hawaiian/Part Hawaiians (41%) in the State.¹¹ During 1999, 3,460 visits were made by 1,468 individuals to the WCCHC Emergency Department for asthma related diagnoses. Children under 14 years old comprised 43% of the 1,468 individuals. Fifty-nine percent (59%) were Hawaiian/Part Hawaiian. The total cost for asthma (all ages) at the WCCHC during 1999 was \$720,360.48, with 51% of

this attributed to ED visits. During 2000, 806 children under the age of 14 presented to WCCHC for asthma related care. Seventy-four percent of these children were Medicaid/Medicaid Managed Care (QUEST) or uninsured. A review of utilization patterns among those managed care patients who incurred the majority of encounters and charges over a one-year period revealed that 5% of total patients were responsible for 25% of the charges. Children with asthma represented a high percentage of these utilizers.⁷

Measurable outcomes included utilization patterns and patient quality-of-life questionnaires. It was anticipated that the asthma management project would result in fewer asthma-related visits to WCCHC and improve quality of life among participants.

Methods

Study Population: The target population was asthmatic children between the ages of 3 and 10 years old for the pilot study and 3 and 14 years old for the 2000-2001 intervention period. During the 1999 pilot study, 78 potential participants were identified, and 40 (51%) consented to participate. Eligibility requirements for this study included an asthma-related hospitalization and/or more than one asthma-related ED or same day office visit in the past 45 days. Two hundred thirty-one children were referred during the 2000-2001 intervention period, with 48 (21%) of these agreeing to be program participants. Program participants for both phases ranged from mild to severe asthma classifications.

To identify participants for the pilot study, various methods were employed. An electronic tracking system was developed which sent daily printouts of all asthma-diagnosed ED encounters to the asthma educators for review. From October to December 1999, the search was broadened to include all patients who received updrafts in either the ED or at an office visit. In an effort to enhance potential participation, referrals from primary care providers and case management were also accepted.

Project Design: In order to develop a standard system of care for asthma management, WCCHC selected the NAEPP Asthma Guidelines as an infrastructure. A multidisciplinary team representing pediatrics, family practice, internal medicine, chronic disease, behavioral health, pharmacy, and preventive health convened to review these guidelines with respect to the cultural needs of the community and the current practices of the WCCHC's providers. The NAEPP Asthma Guidelines were adapted to Waianae practice and adopted by the providers in July 1999. During the implementation phase of the pilot study, two community health workers (CHWs) were trained for 11 months in the following areas: anatomy and physiology of asthma; symptoms

and triggers; severity classifications; asthma medications; peak flow meter, inhaler and spacer use and care; and relaxation and strengthening exercises. Potentially high-risk asthma participants were referred to the asthma management program through the electronic system or by the primary care provider (PCP). After reviewing the patient's history and asthma intervention plan documented in the medical chart, initial appointments were made by the CHWs as home visits. The first visit focused on building rapport, evaluating family and social supports, and assessing the home environment for triggers. Barriers to regular medical follow-up care, treatment, compliance, and quality of life were also assessed. The CHW then collaborated with the asthma treatment team (PCP, CHWs, project coordinator, MD consultant, and patient) to develop an asthma intervention plan, with particular emphasis placed on medication management. Visit results were recorded in progress notes and encounter forms were printed for each subsequent visit to facilitate tracking of utilization.

For the 2000-2001 grant period, the home outreach model was expanded on. Greater efforts were focused on integrating the asthma management/education services into existing clinics and programs through in-office education. The management curriculum remained similar to the pilot year with greater emphasis on medication management. Additional educational tools to augment asthma education included a set of diseased lungs, a year's supply of cigarette tar in a bottle, medical complication flip charts, and an interactive asthma education CD.

An Asthma Management Education and Assessment Summary Report was developed for use by the CHWs when communicating information in the medical chart. This form helped the asthma management team track patient self-management goals such as medication management, environmental triggers, exercise, relaxation, and prevention. Chronic disease self-management was added as an electronically track-able procedure

on both the enabling and medical encounter forms in April 2001. In addition, the brief quality of life tool developed during the pilot year was continued for both pre and post assessments.

Results

Patient Encounters: Forty of the 78 potential participants consented to be part of the pilot program. The home evaluation form was completed for 20 (50%) of these patients.

Two hundred thirty-one children were referred to the 2000-2001 asthma management project. Forty-eight (21%) of these actively participated in the program. CHWs conducted a total of 158 visits among these 48 participants.

Utilization Patterns: The 40 pilot study participants visited WCCHC with asthma related complaints 103 times from March 1, 1999 to April 30, 2000. Of this total, 83 visits occurred before the participants' first encounter with the CHW. Twenty visits occurred after the first encounter. The latter number represents 19% of the total number of visits. Before CHW intervention, the program participants averaged 1.5 visits per person. After the first CHW visit, this decreased to 0.25 visits per person. The charges incurred for all visits was \$36,613 (excluding the salary for 1 FTE CHW at approximately \$28,000/year). Of this total, \$29,384 was charged before the participants' first encounter with the CHW and \$7229 was charged after the first encounter. The latter number represents 20% of total charges. Per capita, this means a decrease from \$735 to \$181 for asthma related visits. In addition, 28 of the 40 (70%) participants did not have another asthma related visit to WCCHC after their first encounter with the CHW.

It is interesting to note that two non-compliant participants incurred bills for \$3,302 after their first CHW encounter. If this amount were subtracted from

Table 1.— Pilot Study Home Evaluation Summary

Homes not evaluated	% of homes	Homes evaluated	% of homes
No consent for home visit - seen in clinic	38%	One or more asthma triggers noted	100%
Unsafe to enter	7%	Smoking noted	75%
Could not locate	5%		

Table 2.— Pilot Study Period

Measurable Outcome	Before CHW Intervention	After CHW Intervention
Total costs to WCCHC among program participants	\$29,384 (\$735 per capita)	\$7,229* (\$181 per capita)
ED encounters among program participants	60	10
ED costs among program participants	\$948 per capita	\$469 per capita
Total number high utilizers	176	

* includes two non-compliant individuals who incurred \$3302; charges do not include CHW salary

the total charges and charges incurred after the first CHW visit, only 9% of total costs would have been charged after the initial asthma education visit.

The number of asthma related complaints seen in the ED among the program participants decreased from 60 to 10 after the initial CHW encounter. This translates to an average of \$948 per capita before CHW visit and \$469 after initial CHW encounter. Additionally, 61% of all participants had no further asthma related ED visits.

Total asthma related expenses for the 2000-2001 study period decreased by more than half among the 48 participants after the first CHW encounter. During the period of October 1, 2000 through September 30, 2001, program participants visited the WCCHC for asthma related complaints a total of 134 times and incurred a total of \$14,866 before CHW intervention. After the first CHW visit, a total of \$6,185 was spent. Per capita, this shows an average decrease from \$310 to \$129. Total ED visits decreased from 32 prior to initiation of CHW intervention to 10 following the initial educational session. Average asthma related ED charges dropped from \$1119 per person to \$188 per person after CHW intervention. The number of high utilizers, defined as those presenting to the ED for asthma related symptoms three or more times a year, decreased 91% from 176 in 1998 to 16 in 2001.

In an effort to assess seasonal variation, total asthma related expense was also examined among 17 patients referred to the project that failed to show up for asthma education with the CHW. No significant change was noted prior and following referral. The total amount spent on these individuals before referral was \$14,493, and after referral it was \$13,002. Average per capita charges among referred children that did not participate

in the study decreased from \$853 prior to initial CHW referral to \$765 at the end of the grant year.

Quality of Life: For the pilot program, 25 (63%) of the 40 participants returned the quality of life evaluation forms. Thirty-six individuals (75%) completed the quality of life forms during the year 2000. An overall improvement was sustained over both years.

Discussion

Program Participants: Several factors contributed to the fact that only 40 out of the 78 patients recruited actually participated in the program. The pilot study began in the spring, a time of year when there is a decrease in the number of asthma related complaints. Therefore, the number of potential participants to evaluate for the asthma program was limited until the winter months, when the number of asthma related complaints increased. It was difficult to make initial phone contact with several patients due to wrong numbers, numbers no longer in service, and relatives not relaying messages. Some parents were uncomfortable with a "stranger" calling their house. Due to the lag time in between receiving a potential participant's name and actual contact, some parents were not interested in the program since they were no longer alarmed by their child's recent bout with asthma.

Of the 40 patients who consented to an initial visit with the CHW, difficulties were encountered in establishing follow-up appointments. Although future appointments were scheduled at the time of the first visit, many of those appointments resulted in cancellations or no-shows. An unforeseen condition was that living situations changed. Contacting the participant

Table 3.— 2000 - 2001 Intervention Period

Measurable Outcome	Before CHW Intervention	After CHW Intervention
Total costs to WCCHC among program participants	\$14,866 (\$310 per capita)	\$6,185 (\$129 per capita)
ED encounters among program participants	32	10
ED costs among program participants	\$1119 per capita	\$188 per capita
Total number high utilizers	16	4

Table 4.— Assessing for Seasonal Variations

Control Group	Before CHW Referral	After CHW Referral
17 patients who were referred to program but did not participate	\$14,493 (\$853 per capita)	\$13,002 (\$765 per capita)

Table 5.— Quality of Life

Indicator	Pilot Program Response	Year 2000 Response
Fewer daytime symptoms	96%	79%
Fewer nighttime symptoms	72%	42%
Fewer symptoms during exercise	84%	59%
Decreased number of asthma related doctor visits	92%	67%

by phone often required several attempts. If possible, the CHW offered asthma education in conjunction with another scheduled appointment at the WCCHC in order to increase the chances of the patient keeping the appointment.

Over time, it became apparent that it was propitious for the CHW to provide as much asthma education as possible at the first appointment. At the second appointment, the CHW reviewed the most important aspect of asthma education for that participant as well as a modified asthma care plan if provided by the PCP.

The major limiting factor for the program was the patient. An attitude of indifference prevailed, making it difficult to set an appointment when the child was not experiencing symptoms. Therefore, it was proposed for the ensuing study phase that asthma education be combined with scheduled PCP appointments. The CHW would be on-call and would aim to establish rapport and begin asthma education at these short encounters.

The initial intent of the 2000-2001 intervention period was to specifically focus on children with excessive ED utilization or with frequent same-day out-patient clinic visits. However, due to the low number of referrals during the first quarter of the grant year, any direct provider referrals were followed by the asthma management team. It may appear that with only a 21% participation rate drawing conclusions based on this model may be preliminary. Yet the dramatic decrease in ED utilization illustrates the importance and relevance of this community-based asthma management program.

Sorting through the ED printouts was tedious, cumbersome, and yielded only one active participant. Direct involvement by providers, who referred patients at the time of the clinic visit, provided the most positive assurance that the patient would successfully participate in the program and fostered a sense that the asthma management project was a vital component of clinical asthma care at the WCCHC.

A key to successful integration of asthma management education appears to be the support of the medical provider as well as the timing of the intervention. Education integrated into either a symptomatic or preventive clinic visit reinforces the importance of the prevention and disease management component. Likewise, when the patient presents to the ED at the time of crisis and greatest need, educational intervention would likely be most effective. Most patients did not verbalize or demonstrate interest in asthma education after the crisis was resolved.

Utilization Patterns: Previous studies have shown that coordinated asthma education/management programs have the propensity to decrease ED utilization, hospitalizations, and other asthma-related expenditures. One military hospital saved an estimated \$4845 per

asthma patient annually after asthma education was provided,¹² while another military hospital decreased hospital admissions from 147 to 87 over the two years that their asthma management program was in place.¹³ A third hospital experienced a decreased length of hospital stay of 12 hours per admission and saved an average of \$300,000 per year after an asthma education program was implemented.¹⁴ Positive outcomes were demonstrated in the WCCHC asthma management program even after seasonal variations were assessed. Over the three years that the asthma management program was in place, asthma related ED visits and expenditures continued to decrease. The success of the program can be seen most clearly in the drastic decrease of high utilizers.

In a study comparing a randomized control group receiving a one-time asthma education session with a group receiving the education plus asthma case management, a decrease of 57% to 75% in resource utilization was noted in the experimental group.¹⁵ The WCCHC used an integrated, patient-centered, multidisciplinary team approach in the asthma management program. Case management inevitably became a part of the program as CHWs conducted home assessments and met with the participants 2 to 3 times over the course of the intervention. This asthma case management component, as opposed to a one-time education session, may have contributed to the success of the program.

Another strength of the asthma management program may have been the repeated emphasis on proper medication management. A recent study found that, due to inadequate asthma education at the doctor's office, most parents develop a "trial and error" methodology in caring for their asthmatic children. Nearly half of those parents interviewed reported receiving little or no education at the time of first asthma diagnosis. Additionally, over half of those parents of children with an established history of asthma did not understand the way their children's medication worked.¹⁶ The implications of misunderstanding the mechanism of medication action have a direct impact on asthma-related ED visits. Farber et al. correlated a misunderstanding of inhaled corticosteroid action with an 82% decrease in daily use of the medication.¹⁷ Daily use of inhaled corticosteroids has been shown to contribute to a significant decrease in ED visits.¹⁸

Conclusion

The asthma management program has demonstrated success in improving utilization patterns and in reducing asthma related expense among program participants. Improvement has also been noted in quality of life as expressed through frequency and time of asthma symptoms. The WCCHC's community-based asthma prevention/education program has been refined through cultural adaptation of scientifically based

disease management guidelines and development of the infrastructure that incorporates tracking and identification of asthma patients.

Acknowledgements

The authors would like to acknowledge the participants of the Waiānae Coast Comprehensive Health Center as well as CHWs Cris Kaao and Musu Maneaiaiga. We would also like to acknowledge the generous contributions of the HMSA Foundation who provided the funding for this project.

References

1. Myers TR, Chatburn RL. Pediatric asthma disease management. *Respir Care Clin N Am* 2000;6(1):57-74. [Abstract]
2. CDC. Disabilities among children aged less than or equal to 17 years--United States, 1991-1992. *MMWR* 1995;44:609-13.
3. Akinbami LJ, Schoendorf KC. Trends in childhood asthma: prevalence, health care utilization, and mortality. *Pediatrics* 2002;110(2):315-322.
4. State of Hawaii Department of Health. Hawaii Health Survey 2001. Available online at: <http://hawaii.gov/doh/stats/surveys/hhs/hhs01.html> Accessed October 17, 2003.
5. State of Hawaii Department of Health. Hawaii asthma fact sheet. March 2003.
6. CDC Media Relations: Facts about asthma. Available online at: <http://www.cdc.gov/od/oc/media/fact/asthma.htm> Accessed October 17, 2003.
7. Chan DS, Callahan CW, Beckham S, et al. Report of the first annual Hawaii asthma research consortium. *Hawaii Medical Journal* 2002;61:164-7.
8. Carl JC, Kerckmar CM. Management of acute pediatric asthma. *Curr Allergy Asthma Rep* 2002;2(6):468-76. [Abstract]
9. Mannino DM, Homa DM, Akinbami LJ, et al. Surveillance for asthma--United States, 1980-1999. *MMWR* 2002;51(SS01):1-13. Available online at <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5101a1.htm> Accessed October 15, 2003.
10. Lozano P, Sullivan SD, Smith DH, Weiss KB. The economic burden of asthma in US children: estimates from the National Medical Expenditure Survey. *J Allergy Clin Immunol* 1999;104(5):957-63.
11. US Census Bureau. Available online at: www.census.gov/census2000/states/hi.html Accessed October 15, 2003.
12. Higgins JC, Kiser WR, McClenathan S, Tynan NL. Influence of an interventional program on resource use and cost in pediatric asthma. *Am J Manag Care* 1998;4(10):1465-9.
13. Chan DS, Callahan CW, Moreno C. Multidisciplinary education and management program for children with asthma. *Am J Health Syst Pharm* 2001;58(15):1413-7.
14. Ebbinghaus S, Bahrainwala AH. Asthma management by an inpatient asthma care team. *Pediatr Nurs* 2003;29(3):177-83.
15. Greineder DK, Loane KC, Parks P. A randomized controlled trial of a pediatric asthma outreach program. *J Allergy Clin Immunol* 1999;103(3 Pt 1):436-40.
16. Peterson-Sweeney K, McMullen A, Yoos L, Kitzman H. Parental perceptions of their child's asthma: management and medication use. *J of Pediatr Health Care* 2003;17:118-25.
17. Farber HJ, Capra AM, Finkelstein JA, et al. Misunderstanding of asthma controller medications: association with nonadherence. *J of Asthma* 2003;40(1):17-25.
18. Adams RJ, Fuhlbrigge A, Finkelstein JA, et al. Impact of inhaled anti-inflammatory therapy on hospitalization and emergency department visits for children with asthma. *Pediatrics* 2001;107(4):706-11.


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